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A Study of Aquatic Insects of Logan River, Utah

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A STUDY OF AQUATIC INSECTS OF LOGAN RIVER, UTAH

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A STUDY OF AQUATIC INSECTS OF LOGAN RIVER, UTAH

by

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Also, I am indebted to Dr. G. F. Edmunds, Jr., and Dr. A. R. Gaufin of the University of Utah for the determination of mayflies and stoneflies.

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INTRODUCTION

Problem

The field of aquatic biology requires intensive work and investigation for getting the important insects for biological studies in laboratory and for estimating the quantity needed as food for fish population in the river.

My studies have been qualitative (quantitative only in a very general way), my main purpose being to discover and record what insects are present at the different stations during the months of September to June of 1953-54, in which this study has been in progress.

Detailed life history studies of the insects will surely follow by later workers.

Review of literature

Dr. J. G. Needham, Professor of Entomology at Cornell University, assisted by R. O. Christenson, collected and classified insects of Logan River in the summer of 1926. Their results (in part) were published in Utah Experiment Station Bulletin 201, Economic Insects in Some Streams of Northern Utah. This bulletin has been very useful in my studies.

More recent collections have been made by Dr. Edmunds at the University of Utah, and by Zoology and Wildlife staff members and students of the Utah State Agricultural College. Dr. G. F. Knowlton, Professor of Entomology at the Utah State Agricultural College, and Fred Harmston, graduate student, collected adult caddice flies and stoneflies in Logan Canyon, which were part of their extensive collections of all kinds of insects in Utah. Dr. H. H. Ross of Illinois Natural

Survey, determined the caddice and stoneflies they collected.

But these collections are incomplete and I have found it necessary to seek assistance from specialists at other institutions. Dr. G. F. Edmunds and Dr. A. R. Gaufin, Professors of Biology at the University of Utah, have been most helpful, as already acknowledged.

Classification of insects in the immature, active stages (larvae and nymphs) is even today in a very rudimentary stage; consequently, quite a number of these insect larvae and nymphs are determined to genus only.

The well-known aquatic insects that were found are: Ephemerida (mayflies), Plecoptera (stoneflies), Trichoptera (caddice flies), Diptera (true flies), Coleoptera (beetles), Hemiptera (water boatman), and Odonata (dragon and damsel flies).

A survey of the literature reveals 91 species of aquatic insects collected in or near the river. In this study approximately 44 genera and 22 species were collected and classified. Seven are new records.

TECHNIQUE OF COLLECTION

In collecting aquatic insects three methods were used:

1. Hand screen. The screen of window wire screen has two handles, one on each side. The screen is wider than long (2 x 3 ft.) It was used for getting bottom samples of immature insects lying on the river bed, hiding beneath the rocks, or attached to boulders.

The screen is dipped into the water by one collector, held against the current with handles pushed against the bottom, while his assistant moves the rocks with his feet or a pick. The current sweeps the insects from their hiding places and lodges them against the screen. They are then lifted and shaken into a large, white pan, then transferred to preserving bottles.

2. Hand picking. The stones are lifted from the river bottom, set on the banks, and the insects are captured one by one from the rocks, and are transferred to preserving bottles.

3. Nets. The aerial net is used to catch the flying (adult) insects that have recently emerged from the nymph and pupal stages to the air. Some of them perch on the trees or on the walls of bridges; those we hand pick. The insects are then stored in vials or small bottles containing preservative. A strong, triangular dip net was also frequently used. The bottles were taken to the laboratory for classification and storage of the numerous specimens. The date, locality, and water temperature were noted and recorded on the label of the bottle. More data were recorded on a stream survey form used at each station on

the date visited. A sample form is shown on page 5.

Trips to the canyon were made each week from September to mid-June. An afternoon was frequently required to visit and collect from three or four of the stations. Each station was therefore visited and collections made every three to four weeks. In the spring (1954) trips were made weekly and semi-weekly to the lower and more fruitful stations. Nearly every station was at a bridge. On the bridge supports insects crawled up to emerge as adults. Bottom samples were taken from different areas each trip, usually from two or three square yards.

Table 2 shows the date of collections, 1953, 1954.

STREAM SURVEY FORM

Locality Red Banks, Logan R. Elev. 6350 Date April 1, 1954
Hour 3 P.M.

Speed of flow:
white water (yes)
ripples
smooth water

Bottom:
mud
sand
gravel
boulder (yes)

Transparency:
clear water (yes)
turbid water
muddy water

Depth(s) 2 - 3 ft.
Direction of flow: S - E

Temp. of water 8° C.
Temp. of air 12° C.

Width: 25 ft. Length 35 mi.

Profile of bottom banks: sketch

Plants (aquatic, on banks, coll., observed):
Green algae, willows, aspen, grasses.

Methods used: Net screen and hand-picking from rocks.

Other animal life collected, observed: Dipper,
aspen treen cut by beavers.

Insects collected:

Mayflies Nymphs:
Ephemerella doddsi
E. grandis
Rhithogena sp.
Baetis sp.

Caddice Flies
Rhyacophila larvae
Adult caddice fly undetermined
Rhyacophila pupa in the rocks
Hydropsyche larvae
Brachycentrus sp.
Glossoma sp.

Stoneflies:
Adult Hydroperla parallela
Acroneuia pacifica (Nymphs)
Pteronarcys californica (Nymphs)
Pteronarcella badia (Nymphs)
Isoperla sp.

Diptera (true flies)
Adult flies undetermined
Atherix larvae
Antocha sp.
Bibiocephila sp.
Eriocera sp.

Collector D. S. Mutlag

PRESERVATION OF INSECTS

The collection of aquatic insects I preserved in a solution composed of:

6 parts	95% alcohol
3 parts	distilled water
1 part	acetic acid
1 part	glycerin

This solution is satisfactory for preserving aquatic insects. It has a bleaching action after a certain length of time. Some insects became brittle, others became soft, probably caused by overcrowding.

Dr. G. F. Edmunds told me that in his collecting of adult mayflies he used only ethyl alcohol with satisfactory results.

A 5% solution of formalin was sometimes used in the field. The specimens were later transferred to the 6-3-1-1 solution.

ENVIRONMENT

General features of Logan River

Logan River is a swift-moving stream. Its water comes from the mountains of northern Utah and southern Idaho. The many sources are small to large streams from snow banks and springs, and summer rains.

At Red Banks and the Forestry Camp the river continues to run swiftly, and the bottom consists of rocks and boulders.

At Ricks Spring, Cave Bridge, the Forks, and Card Ranger Station the water is fast ("white water") and the bed of the river is rocks and boulders. The slopes of the mountains are steep.

At DeWitt Camp station the water becomes less swift and the bottom is gravel, sand, and a little clay.

At the Third Dam station at Spring Hollow the water is enclosed in a reservoir and runs very slowly, and the bottom of the river is composed of sand and clay. There is much vegetation in spots.

At the First Dam station the water is also slow-moving, and in the river bed there is clay, sand, gravel, and some vegetation.

The river now flows into Cache Valley, and runs towards Little Bear River. In this area the water is turbid, and the number of insects is decreased in comparison to the regions in the canyon. The length of the river from the Utah-Idaho state line to its junction with Little Bear River is approximately 35 miles.

Elevation from source to mouth

The elevation of Logan River is high at the upper sources--approximately 7,000 feet at the Idaho-Utah line to 6,730 feet in the

north part of Logan canyon. Then the elevation decreases gradually. For example: At Red Banks station the elevation is 6,350 feet, at Ricks Spring 5,900 feet, at Cave 5,500 feet, at Third Dam 5,000 feet, at First Dam 4,700 feet, and at the Sugar Factory Station 4,475 feet.

The distances between the above stations are specified below:

Utah-Idaho line to Red Banks	- 7.4 miles
Red Banks to Forestry Camp	- 1.5 "
Forestry Camp to Ricks Spring	- 2.5 "
Ricks Spring to Cave Bridge Sta.	- 2.4 "
Cave Bridge Sta. to Forks Bridge	- 2.7 "
Forks Bridge Sta. to Card Sta.	- 1.5 "
Card Sta. to DeWitt Camp Sta.	- 2.5 "
DeWitt Sta. to Third Dam	- 0.5 "
Third Dam to First Dam	- 3.5 "
First Dam to Little Bear River	-10.5 "

A map of Logan River showing the stations from which insects were collected is shown on page 9.

The average gradient of Logan River is approximately 74 feet per mile, and average depth is 0.75 feet.

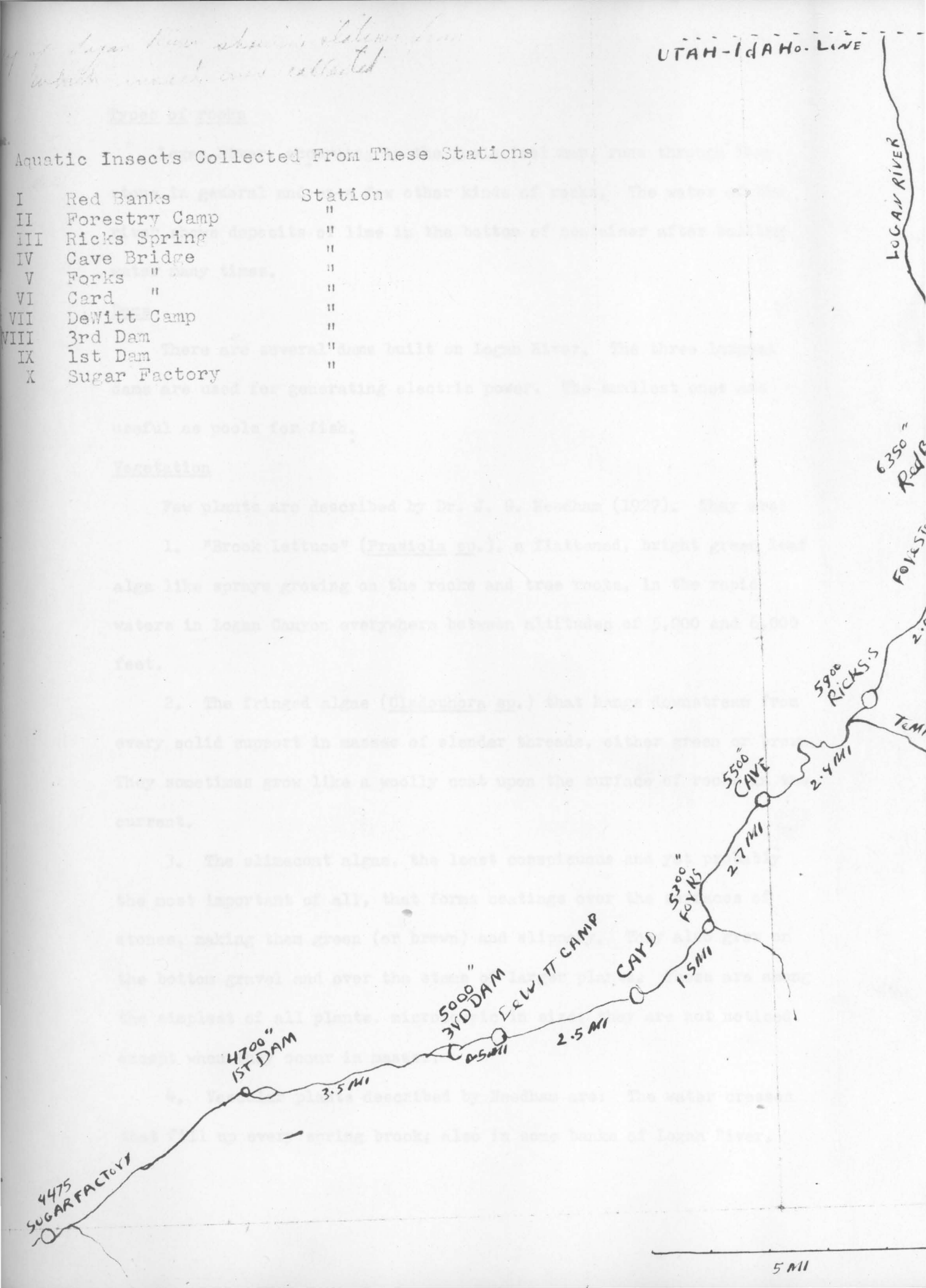
Water temperature of the water of Logan River from April to October ranges from 37 to 56° F. (Fleener, 1950), and averages 52° F. during June and July.

Seasonal variations of flow

The flow of Logan River varies with the seasons. It increases greatly during the months of May and June, then decreases gradually during the summer months until by late Autumn and winter it is at its lowest ebb.

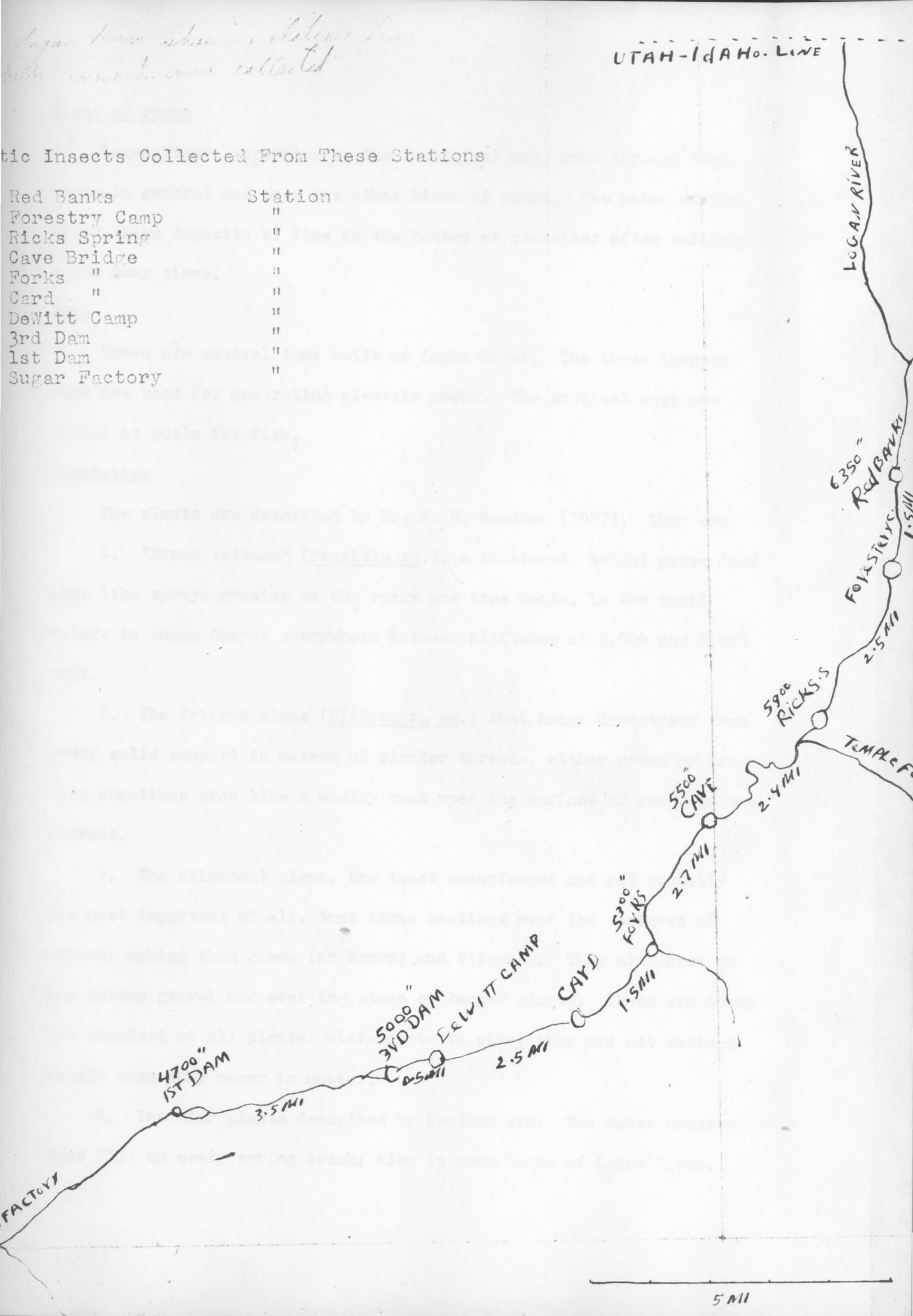
Aquatic Insects Collected From These Stations

I	Red Banks	Station
II	Forestry Camp	"
III	Ricks Spring	"
IV	Cave Bridge	"
V	Forks "	"
VI	Card "	"
VII	DeWitt Camp	"
VIII	3rd Dam	"
IX	1st Dam	"
X	Sugar Factory	"



tic Insects Collected From These Stations

Red Banks	Station
Forestry Camp	"
Ricks Spring	"
Cave Bridge	"
Forks "	"
Card "	"
DeWitt Camp	"
3rd Dam	"
1st Dam	"
Sugar Factory	"



Types of rocks

Logan River, according to the geological map, runs through limestone in general and on a few other kinds of rocks. The water of the river shows deposits of lime in the bottom of container after boiling water many times.

Dams

There are several dams built on Logan River. The three largest dams are used for generating electric power. The smallest ones are useful as pools for fish.

Vegetation

Few plants are described by Dr. J. G. Needham (1927). They are:

1. "Brook lettuce" (Prasiola sp.), a flattened, bright green leaf alga like sprays growing on the rocks and tree roots, in the rapid waters in Logan Canyon everywhere between altitudes of 5,000 and 6,000 feet.

2. The fringed algae (Cladophora sp.) that hangs downstream from every solid support in masses of slender threads, either green or brown. They sometimes grow like a woolly coat upon the surface of rocks in the current.

3. The slimecoat algae, the least conspicuous and yet probably the most important of all, that forms coatings over the surfaces of stones, making them green (or brown) and slippery. They also grow on the bottom gravel and over the stems of larger plants. These are among the simplest of all plants, microscopic in size; they are not noticed except when they occur in masses.

4. Vascular plants described by Needham are: The water cresses that fill up every spring brook; also in some banks of Logan River.

"Brook grass" that trails among stones, broom-like. Water mosses of various sorts that often densely cover the stones in the spring brooks.

Professor Arthur H. Holmgren, Curator Herbarium of the Utah State Agricultural College, has identified the following plants:

1. Algae

a.	Ulothrix sp.	Submerged plants
b.	Vaucheria sp.	" "
c.	Cladophora sp.	" " on rocks.
d.	Several sp. of diatoms	" " " "

2. Angiosperm monycotyledoneae

a.	Potamogeton sp.	Submerged plant, near First Dam
b.	Sagitittaria cuneata	Submerged plant, near First Dam
c.	Elodea canadensis	Submerged plant, near Third Dam
d.	Ranunculus aquatilis	Submerged plant, near Third Dam

Fish of Logan River

Logan River contains 19 species of fishes of which 11 are introduced and 8 are native. The following are the best known:

1. Salmo clarki
2. Salmo gairdneri irideus
3. Coregonus williamsoni
4. Catostomus fecundus
5. Pantosteus platyrhynchus
6. Cyprinus carpio
7. Richardsonius balteatus
8. Gila atraria
9. Rhinichthys cataractae luleus

10. Cottus bairdi

Amphibians of Logan River

The weather of Cache County is often severely cold during winter. On account of this cold weather there are very few amphibians existing in Logan River. These are: Tiger salamander, Ambystoma tigrinum; Woodhouse toad, Bufo woodhouse; and Leopard frog, Rana pipiens, in the lower portion of the river. The Boreal toad, Bufo boreas, usually occurs near the upper part of the river.

Some reptiles of Logan River

The Wandering Garter Snake and Red-barred Garter Snake, Thamnophis ssp., (so-called water snakes) enter the water and may feed on fish.

Birds of Logan River

1. Dipper. This bird often feeds on the bottom of the river and is found in all parts of the canyon.

2. King-fisher. Around Logan River, feeding on small fishes.

3. Killdeer. Feeds on banks of the river in shallow places.

4. Other birds found in or near Logan River are: California gull, coot, mallard, gadwall, baldpate, pintail, green-winged teal, cinnamon teal, shoveller, red-head ducks, American golden eye, buffle-head, American merganser, and many song-birds and wood-peckers in trees.

Mammals of Logan River

Few mammals live or feed in Logan River; these are:

1. Muskrat, found along Logan River in the upper and lower parts.

2. Shrews, found in upper parts of Logan River.

3. Beaver, found in many parts of Logan River where the brush and aspen trees are found.

Invertebrates

Of minor importance but worthy of naming are the following Invertebrates:

Mollusca: Small clams, Pisidium sp., are present in the sand bars in various parts of the river. Snails of several species are quite abundant in the slow waters of the dams.

Platyhelminthes: Flat worms, Planaria, and Polycelis are found in numbers in cold tributaries, especially at Spring Hollow.

Annelida: Infrequently small, segmented worms resembling the earthworm were collected on the hand screen.

Arthropoda: Crustacea. Crayfish are present, even plentiful, in areas of lower Logan River. Various Entomostraca are also found in the slower waters.

Table 1. A record of insects collected in Logan River

Insects Collected	Bottom Samples		Adult Insects			
	DSM '54	JGN '26	DSM '54	JGN '26	GFE '46	GFK '37
Ephemeroptera						
Ephemerella doddsi	N	N	-	-	A	-
E. grandis	N	N	-	-	A	-
E. coloradensis	N	N	A	-	A	-
E. inermis	N	N	-	-	A	-
E. margarita	-	N	-	-	-	-
E. spinifera	-	N	-	-	-	-
E. hecuba	-	N	-	-	-	-
Leptophlebia pallipes	-	N	-	-	-	-
L. packi	-	N	-	-	-	-
Paraleptophlebia pallipes	N	-	-	-	-	-
P. debilis	-	-	-	-	-	-
Rhithogena minus	-	-	-	-	A	-
R. robusta	-	N	-	-	A	-
R. elegantula	-	N	-	-	-	-
R. brunnea	-	N	-	-	-	-
R. morrisoni	N	-	A	-	-	-
Baetis dardanus	-	N	-	-	A	-
B. tricaudatus	-	N	-	-	A	-
B. bicaudatus	N	N	A	-	-	-
B. parvus	-	N	-	-	A	-
Callibaetis fuscus	N	-	A	-	A	-

Explanations: N = Nymphs. A = Adult. L = Larvae.
DSM = D. S. Mutlag. JGN = J. G. Needham. GFE = G. F. Edmunds, Jr.
GFK = G. F. Knowlton.

Table 1. A record of insects collected in Logan River (cont.)

Insects Collected	Bottom Samples		Adult Insects			
	DSM '54	JGN '26	DSM '54	JGN '26	GFE '46	GFK '37
C. montanus	-	-	-	-	A	-
C. nigrifus	-	-	-	-	A	-
C. pallidus	-	N	-	-	-	-
Caenis simulinas	-	-	-	-	A	-
Siphlonurus occidentalis	N	N	-	-	A	-
Ameletus velox	-	N	-	-	A	-
Heptagenia sp.	N	-	-	-	-	-
Epeorus album	N	N	-	-	A	-
E. deceptivus	N	N	-	-	-	-
Centroptilum conturbatum	N	-	-	-	-	-
Tricorythus explicatus	-	N	-	-	A	-
Chirotenetes sp.	-	N	-	-	-	-
Plecoptera - stoneflies						
Pteronarcys californica	N	N	A	A	-	A
Pteronarcella badia	N	N	A	A	-	A
Acroneuria pacifica	N	N	A	A	-	A
Capnia columbiana	-	-	-	-	-	A
C. ligulata	-	-	A	-	-	-
C. elongata	-	-	-	-	-	A
Eucapnopsis brevicauda	-	-	-	-	-	A
Alloperla coloradensis	-	-	-	-	-	A
Isoperla fulva	N	-	A	A	-	A
Nemoura glabia	-	-	-	-	-	A
N. lobata	-	-	-	-	-	A

Table 1. A record of insects collected in Logan River (cont.)

Insects Collected	Bottom Samples		Adult Insects			
	DSM '54	JGN '26	DSM '54	JGN '26	GFE '46	GFK '37
Nemoura sp.	N	-	A	-	-	-
N. besametsa	-	-	A	-	-	-
N. cinctipes	-	-	A	-	-	A
Perlodes americana	-	-	-	-	-	A
Taeniopteryx occidentalis	-	-	-	-	-	A
Brachyptera occidentalis	-	-	A	-	-	A
Dictyopterygella knowltoni	N	-	-	-	-	A
Hydroperla parallella	N	-	A	-	-	-
Trichoptera - caddice fly						
Agaptetus debilis	-	-	-	-	-	A
Arctopsyche grandis	-	-	-	-	-	A
Glossosoma verdona	L	L	-	-	-	A
Hydropsyche californica	L	L	-	-	-	A
H. oslari	-	-	-	-	-	A
H. cockerelli	-	-	-	-	-	A
Chimarraha sp.	L	-	-	-	-	-
Brachycentrus sp.	L	L	-	-	-	A
Rhyacophila basalis	L	-	-	-	-	A
Leptocerus sp.	L	L	-	-	-	A
Limniphilus externus	L	-	-	-	-	A
Philoptamus sp.	L	-	-	-	-	A
Diptera - true fly						
Tanytarsus logani	L	L	-	A	-	-
Antocha monticola	L	L	-	A	-	-

Table 1. A record of insects collected in Logan River (cont.)

Insects Collected	Bottom Samples		Adult Insects			
	DSM '54	JGN '26	DSM '54	JGN '26	GFE '46	GFK '37
Ptychoptera lenis	-	-	-	A	-	-
Limonia venusta	-	L	-	A	-	-
Limnophila sp.	-	-	-	A	-	-
Helobia sp.	-	-	-	A	-	-
Tricyphona sp.	-	-	-	A	-	-
Psiloconopa mormon	-	L	-	A	-	-
Eriocera sp.	L	L	-	-	-	-
Simulium sp.	L	L	-	A	-	-
Bibiocephala sp.	L	L	-	-	-	-
Atherix sp.	L	L	-	-	-	-
Chrysops sp.	L	L	-	-	-	-
Stratiomyia melanostoma	-	L	-	-	-	-
Hilara sp.	-	-	A	A	-	-
Perichoma sp.	L	-	-	-	-	-
Tipula sp.	L	-	-	-	-	-
Coleoptera - beetle						
Elmis sp.	L	-	-	-	-	-
Hydroporus covinus	-	L	-	A	-	-
Parnidae - riffle beetle	-	L	-	A	-	-
Hemiptera - true bugs						
Gerris remigis	-	-	A	A	-	-
Corixid sp.	-	-	A	-	-	-
Notonecta sp.	-	-	A	-	-	-
Odonata - dragon and damsel fly						

Table 1. A record of insects collected in Logan River (cont.)

Insects Collected	Bottom Samples		Adult Insects			
	DSM '54	JGN '26	DSM '54	JGN '26	GFE '46	GFK '37
Sympetrum rubicundulum	N	N	-	A	-	-
Leucohinia sp.	-	-	-	A	-	-
Ischnura sp.	-	-	-	A	-	-
Lestes uncatus	N	N	-	A	-	-
Amphiagrion amphion	-	N	-	A	-	-

Table 2. Date of collection from different stations

Date	Insects collected	Kind	Stations
September 2, 1953	Atherix sp.	L	Found at RB; FC; CB; FB; CC; DW; SF; 3rdD 1stD.
September 2, 1954	Antocha sp.	L	RB; FC; CB; FB.
September 2, 1954	Eriocera sp.	L	RB; FC; CB; FB.
September 2, 1953	Acroneuria sp.	L	RB; CB.
September 3, 1953	Simulium sp.	L	RS; CC; DW.
September 16, 1953	Tanytarsus sp.	L	RS; FB; CC.
September 16, 1953	Chrysops sp.	L	FB; CC.
September 16, 1953	Acroneuria pacifica	N	RB; FC; RS; CB; FB; CC; DW.
September 21, 1953	Pteronarcys californica	N	RB; FC; RC; CB; FB; CC.
September 23, 1953	Pteronarcella badia	N	RB; FC; RS; CB; FB; CC.
October 2, 1953	Brachycentrus sp.	L	RB; FC; RS; CB; FB; CC.
October 2, 1953	Hydropsyche sp.	L	1stD; 3rdD; SF; RB; FC; RS; CB; CB; FB; CC.
October 2, 1953	Leptocerus sp.	L	3rdD; 1stD; SF.
October 2, 1953	Rhyacophila sp.	L	Found at RB; CB; CC.
October 2, 1953	Tipula sp.	A	FB.
December 20, 1953	Bibiocephala sp.	L	FC; FB; CC.

Explanations: L = Larvae; N = Nymph; A = Adult;
RB = Red Banks; FC = Forestry Camp; RS = Ricks Spring;
CB = Cave Bridge; FB = Forks Bridge; CC = Card Camp;
DW = DeWitt Camp; 3rdD = Third Dam; 1stD = First Dam
SF = Sugar Factory.

Table 2. Date of collection from different stations (cont.)

Date	Insects collected	Kind	Stations
1954 Insects			
February 5, 1954	Bibiocephala sp.	L	RS; FB; CC; DW.
February 5, 1954	Eriocera sp.	L	RB; CB; FB.
February 5, 1954	Tanytarsus sp.	L	RS; CB; FB; CC.
February 5, 1954	Pericoma sp.	L	FC; RS.
February 5, 1954	Atherix sp.	L	RB; FC; RS; CB; FB; CC; DW.
February 5, 1954	Antocha sp.	L	RB; FC.
February 5, 1954	Ephemerella grandis	N	FC; FB; DW.
February 5, 1954	E. doddsi	N	RB; FC; FB; CC; DW.
February 5, 1954	Heptagenia sp.	N	FC.
February 5, 1954	Brachycentrus sp.	L	RB; FC; RS; CB; FB; DW.
February 5, 1954	Glossosoma sp.	L	RB; FC; RS; CB; FB; DW.
February 5, 1954	Acroneuria pacifica	N	FB; DW; 3rdD.
February 5, 1954	Pteronarcys sp.	N	FB; CC.
February 5, 1954	Pteronarcella sp.	N	FB; DW; 1stD.
February 5, 1954	Isoperla sp.	N	FB; DW; 1stD.
February 5, 1954	Baetis sp.	N	FB; DW; 3rdD.
February 5, 1954	Elmis sp.	L	FB; 3rdD.
February 5, 1954	Dictyopterygella sp.	N	CB.
February 19, 1954	Antocha sp.	L	RB; FC; RS; CC.
February 19, 1954	Eriocera sp.	L	RS; CB; FB.
February 19, 1954	Rhyacophila sp.	L	RB; FC; CB; FB.
February 19, 1954	Glossosoma sp.	L	RB; FC; CB; FB.

Table 2. Date of collection from different stations (cont.)

Date	Insects collected	Kind	Stations
February 19, 1954	Hydropsyche sp.	L	RB; FC; RS; CB.
February 19, 1954	Brachycentrus sp.	L	RB; FC; CB; RS.
February 19, 1954	Limnephelus sp.	L	RS.
February 19, 1954	Caddice pupa	P	RB; FC.
February 19, 1954	Caddice adult	A	RB; FC.
February 19, 1954	Atherix sp.	L	RB; FC.
February 19, 1954	Antocha sp.	L	FC; RS.
February 19, 1954	Tanytarsus sp.	L	FC; RS.
February 19, 1954	Isoperla sp.	A	CB; CC; DW.
February 19, 1954	Isoperla sp.	N	RB; CC; DW.
March 5, 1954	Pericoma sp.	L	RS; FC; FB; CC; DW.
March 6, 1954	Bibiocephala sp.	L	RS; FB; CC; DW.
March 6, 1954	Simulium sp.	L	FB; CC; DW.
March 6, 1954	Tanytarsus sp.	L	FB; CC; DW.
March 6, 1954	Pericoma sp.	L	FB; CC; DW.
March 6, 1954	Antocha sp.	L	FB; CC; DW.
March 6, 1954	Atherix sp.	L	FB; CC; lstD.
March 6, 1954	Hydropsyche sp.	L	FB; CC; DW; lstD.
March 6, 1954	Brachycentrus sp.	L	FB; CC; DW; lstD.
March 6, 1954	Glossosoma sp.	L	FB; CC.
March 6, 1954	Caddice fly	A	RS.
March 6, 1954	Ephemerella grandis	N	RB; FB.
March 6, 1954	Nemoura sp.	N	RB; CC.
March 6, 1954	Nemoura sp.	A	RB; CC.
March 6, 1954	Brachyptera sp.	A	FB; DW.

Table 2. Date of collection from different stations (cont.)

Date	Insects collected	Kind	Stations
April 1, 1954	Ephemerella grandis	N	RB; CB; FB;
April 1, 1954	Rhithrogena sp.	N	RB; FB.
April 1, 1954	Baetis sp.	N	CB; FB; DW; 3rdD; 1stD.
April 1, 1954	Atherix sp.	L	FB.
April 1, 1954	Acroneuria sp.	N	CB; FB.
April 1, 1954	Acroneuria sp.	A	RB; CB.
April 1, 1954	Eriocera sp.	N	FB.
April 14, 1954	Callibaetis sp.	A	FB; CC; 3rdD; 1stD.
April 14, 1954	Cranefly	A	3rdD.
April 14, 1954	Nemoura sp.	A	FB.
April 14, 1954	Nemoura besametsa	A	3rdD.
April 14, 1954	N. cinctipes	A	3rdD.
April 14, 1954	Brachyptera sp.	A	CB.
April 14, 1954	Adult caddice	A	CB; RS; 3rdD.
April 14, 1954	True fly adult	A	CB; FB; 3rdD.
April 16, 1954	Adult caddice	A	RB; FB.
April 16, 1954	Tanytarsus sp.	L	CB; FB.
April 16, 1954	Bibiocephala sp.	L	CB.
April 16, 1954	Damsel	N	3rdD.
April 16, 1954	Dragon	N	1stD.
April 21, 1954	Capina sp.	A	FB.
April 21, 1954	C. ligulata	A	FB.
May 5, 1954	Baetis sp.	A	1stD.
May 5, 1954	Rhithrogena sp.	A	1stD.

Table 2. Date of collection from different stations (cont.)

Date	Insects collected	Kind	Stations
May 6, 1954	Callibaetis sp.	A	1stD.
May 12, 1954	Callibaetis sp.	A	1stD.
June 1, 1954	Callibaetis sp.	A	1stD.
June 1, 1954	Baetis sp.	N	1stD.
June 1, 1954	Acroneuria pacifica	A	CC; CB; FB.
June 17, 1954	Pteronarcys sp.	A	CB; FB; CC.
June 17, 1954	Acroneuria sp.	A	CB; FB; CC.
June 17, 1954	Pteronarcella sp.	A	CB; FB; CC.

AQUATIC INSECTS OF LOGAN RIVER

Order Ephemeroptera (Mayflies)

Ephemeridae

Ephemerella grandis Eaton (Prickle-back). This nymph was found in large numbers at DeWitt Camp and at the Sugar Factory stations. Few specimens were found at Red Banks, the Forks, and Card stations.

This nymph is easily recognized. Its color is dark, or brown. The body is rough, stout, and bears a double row of sharp spines above the thorax and abdomen, and a pair of tubercles on the lower part of the head. Also it has three tails or cerci banded with black or brown colors.

For its habitat this nymph prefers slow-running water where there is gravel and trash of leaves in the bottom of the river. I have collected this nymph many times during 1953 and 1954, but not the adult. Needham described the adult as follows: "It is similar to Ephemerella doddsi, but the tail is longer." It is common in Logan canyon below 6,000 feet.

The last time I collected this nymph was June 17, 1954, and the nymphs appeared fully developed and ready to emerge.

The economic value of this nymph as food for fish is debatable; its protective color probably makes it difficult to find, and its roughness probably makes it less palatable to fish.

Ephemerella doddsi Needham, Ginger Quill. This nymph is widely distributed and well-known in Logan River.

The habitat of the ginger quill is in swift-running water where

the bottom of the river consists of boulders, stones, and gravel. It is well known by its ventral sucker on the abdomen, which is a hold-fast for the nymph on the rocks and smooth surfaces. In addition to the sucker there are four pairs of gills on the abdomen. The antenae are short and embedded in deep notches at the front of the head. It also has three tails, the middle one being the thinnest one of the three.

The nymph appears whitish to yellow in color, or sometimes brown; it shows white with a dark band on the thorax when the nymph is small.

Ephemerella coloradensis Eaton. This nymph is found in the upper part of Logan River, where the E. doddsi is found. It is similar to the prickle-back but its color is white to brownish, and it lacks the tubercle on the lower part of the head.

Its habitat is similar to that of the above nymphs. It has much economic value for fish food. According to Needham and G. F. Edmunds these nymphs are given credit for providing 50 percent of the trout food in the upper portion of Logan River.

I have collected these nymphs many times, and on October 2, 1953, I was fortunate enough to collect the adult at DeWitt Camp station. The determination of this adult was by Dr. G. F. Edmunds, Jr.

Ephemerella inermis Eaton. From my collection I found a single specimen at DeWitt Camp. It was determined by Dr. G. F. Edmunds, Jr. The nymph is small, whitish in color. It is flat, has a smooth surface, and differs from the foregoing nymphs by lacking spines and tubercles on the dorsal side of the head.

This nymph appears in swift-running water, with bottoms of boulders and gravel mixed with vegetation.

Heptageniidae

Rhithrogena sp. Red Gill. This nymph was collected from the stations at Card Camp and the Forks on October 2 and October 10, 1953. It can be recognized by the sucker-like discs on the ventral surface of the abdomen. The first pair of gills are enlarged, while other gills are normal. It differs from Ephemerella doddsi by the gills which encircle the abdomen to make sucker-like discs by means of which the nymph may hold fast to the rocks of rapid waters.

R. morrisoni Banks. The adult of Rhithrogena morrisoni is found near the First Dam station; I collected it on the evening of May 5, 1954. The color was dark brown, the eyes were large, and the specimen had two tails which were longer than the body.

The nymphs of these two genera prefer cold running water, with a river bed of boulders. The abdominal sucker-like discs assist them to adhere to the surface of the rocks against the swift current.

R. robusta Dodds. The nymphs of Rhithrogena robusta are found in the same habitats and at the same stations.

Heptagenia sp. This genus was collected at Birch Glen. The nymph is whitish to yellow in color. The head of the nymph is flattened. The thorax and abdomen were slightly convex dorsally, and flattened ventrally.

The nymphs of this genera were found and collected in cold running water, with a river bed of boulders.

Epeorus (Iron) deceptivus McDunnough. This nymph was collected at Red Banks where the water is swift and the bottom of the river is boulders. I found just one specimen, October 2, 1953. The best identifying characteristics of this nymph are its two tails which few mayflies

have, and its flat head which is widest across the front and tapers to the rear. The adult of this nymph has evidently not yet emerged (June 15).

Leptophlebiidae

Paraleptophlebia pallipes Hagen. Dr. Needham called this nymph by the name of Leptophelebia pallipes, and the common name for it is pale-foot mayfly.

The nymph is small, slender, white to greenish in color. The main characteristic of this nymph is the presence of gills that are more or less tuning-fork shaped, and are black in color. Needham mentioned other species--Leptophlebia packii, or tusker, found at Ogden River, but the latter may or may not be found in Logan River.

Baetidae

Baetis bicaudatus Dodds. This nymph was collected in many places along Logan River. It is found at Red Banks, Ricks Spring, and First Dam. It is small and of various colors, and has two tails. The gills are seven simple, oval plates.

B. tricaudatus Dodds. This nymph is similar to B. bicaudatus, but has two tails, the middle being the shortest. The habitat of the Baetidae is usually in swift-running water.

The adult of Baetis bicaudatus was found flying at the Utah State Agricultural College campus on March 5, 1954.

Callibaetis fuscus Dodds. This nymph was found in abundance at the First Dam where the green algae was found in large masses. Also I collected this nymph at the Third Dam.

The adult of this species was collected in the evening at the First Dam, where the adults were lying on the green algae near the

banks of the river. At the Third Dam the adults were collected in a spider-web near the surface of the water on May 5, 1954.

Centroptilum sp. Eaton Edmunds. This nymph was collected October 16, 1953, at DeWitt Camp. Its habitat was slow-running water with gravel and vegetation at the bottom of the river. The adult of this genus has not yet been found.

Siphlonuridae

Siphlonurus occidentalis Eaton Western Bunch Gill. This species was collected at the Third Dam. The adult had emerged but just the skin of the nymph was on the water, and was identified by the gills which formed a bunch-like structure.

Order Plecoptera (Nymphs of Stoneflies)

Stonefly nymphs may, in general, be recognized from mayflies by their two claws, gill filaments, and larger size.

Most of the nymphs are carnivorous. The usual habitat of these nymphs is swift-running water with boulders, gravel, and little vegetation on the bed of the stream.

Except for some species that are rare, I collected these nymphs from every station from upper to lower Logan River.

Once I examined the stomach of Acroneuria pacifica and found therein 10 mayfly nymphs. Then I examined the contents of the stomach of a Pteronarcys californica, but failed to find any mayflies there.

Perlidae

Acroneuria pacifica Banks (Western drummer). This nymph was collected in all stations, but is bigger in the upper part of Logan River. It is found in large numbers at the Forks. The size of this nymph is almost equal to the size of the Pteronarcys californica. It was found

in slow and fast-running water with beds of boulders, gravel, sand, and clay in Logan River.

I have collected this nymph many times and brought it to the laboratory alive. When the nymph was placed in a panful of tap-water the respiratory behavior was noticeable. The body moved up and down with the gill filaments well-spread out.

This nymph shows great activity when taken from the water, and moves very fast to escape from the collector. The nymph may be easily recognized by its white tuft of gills at the base of the legs, also by the white tuft of gills between the tails. The color of the nymph is mottled yellow and brown, but is sometimes dark when located where there is vegetation in the bottom of the river. This nymph was described by Needham, and I quote from the 1927 bulletin, No. 201. He said, "It (western drummer) eats mayfly nymphs and other herbivores; and wherever it occurs abundantly these are sure to be scarce."

This nymph appears to compete with other trout food in the river. As mentioned above I found the nymphs of mayflies in the stomach of the Acroneuria pacifica. The latter is good food for fish also.

The adult of this nymph is second in size to the Pteronarcys californica. The adult male is smaller than the female; also its wings are short while the female's wings are relatively long. On June 17, 1954, I found the adult Acroneuria in large numbers, most of them mating, under the bridge of Forks station; also on trees and on low vegetation. Numerous cast skins were found on walls of the bridge near the water and also on the willows, trees, and large stones.

The skin splits from the middle of the head and the whole thorax in the transformation of the adult from the nymph stage. These adults,

Acroneuria pacifica, formed clumps on the trees during mating, and I found many males with one female. Dr. Stanford found one male of Acroneuria pacifica trying to mate with Pteronarcys californica, but its body was too short to reach the genital opening of the female.

The male is well recognized by its round percussion disc or hammer underneath the next to the last (ninth) abdominal segment with which he drums or taps on the leaf. Needham explained this action as the means of attracting the attention of the female. I collected the male and the female in the Cave station on the day mentioned above.

The stonefly adult appears to live longer than the mayfly adult. I found some leaves on the willows and birch considerably damaged by the clumps of adults.

Nemouridae

Nemoura besametsa Ricker. This nymph was found at the Red Banks and the Forks stations. They are small in size and of dark color. The best characteristic for identification of the nymph and adult of N. besametsa is the two tube-like gills under the side of the neck.

N. cinctipes. In the adult the wings are one-third longer than the body, and there is a bunch of gills under the side of the neck.

In the Nemoura sp. the hind wing pads extend out from the body at an angle.

The adults of all these stoneflies were collected April 14 and April 21, 1954; and nymphs were collected April 1, 1954.

Capina ligulata Clsn. This species is found at the Forks station as adults. They are very small stoneflies; the wings are transparent and longer than the body. A good identifying characteristic for the adult is the abdominal segments which are wider than long.

Brachyptera occidentalis Bks. This nymph was found at Cave station, February 19, 1954. The habitat is in swift-running water with a river bed of boulders. I have collected a few of them. The nymph shows no gill filaments on the coxa. The adult was collected from Cave station, March 6, 1954. An adult was collected by Dr. G. F. Knowlton in 1937.

Perlodidae

Dictyopterygella knowltoni. This adult stonefly was found 0.1 mile below the Forks station, February 5, 1954.

Isoperla fulva Clsn. The nymph of this species was collected February 19, 1954, at Cave, the Forks, and DeWitt stations. The habitat is in swift-running water with boulders and gravel on the river-bottom.

The adult was collected March 19, 1954, at the Forks station.

Hydroperla parallela. This nymph was collected October 10, 1953, at Red Banks, Forks, Card, and DeWitt Camp stations. Apparently they prefer the swift-running water.

I found the adults April 21, 1954, at Card and the Forks stations.

The best characteristic for recognizing the nymph is the tracheal gills which are very small, single, and bud-like on the under side of the neck and thorax.

Pteronarcidae

Pteronarcys californica Newport Big Curler. This nymph is the largest of the Order Plecoptera. The nymph is herbivorous. The body is reddish to dark brown on the upper part, and the lower part is lighter. It is readily recognized by its prothorax which has four pointed angles, and by two pairs of gills present ventrally on the first and second abdominal segments. These nymphs are found at many stations, such as Red Banks, Forestry Camp, Ricks Spring, Cave, Card,

and the Forks. They are found in large numbers at Forks and Card stations, but are scarce at the DeWitt Camp, Third Dam, First Dam, and Sugar Factory stations. The habitat of these nymphs is running water, boulder and gravel bottoms. They were collected during all times of the year.

On June 1st I dissected some of these nymphs and found that some of the eggs were well developed. The eggs of the adult are purple, leathery, and granulated on the surface, and dome-shaped with a rounded disk at the base.

The adults were found on June 17, 1954, at the Card, Forks, and Cave stations, clumped together. Like Acroneuria pacifica they were mating, and there were often many males with one female. The color of the adult is grayish above with a bright orange and yellow abdomen. The adults are also known as Salmon flies, due to the similarity in color to salmon flesh.

Most of the adult insects were secreting a juicy, yellow substance from joints of the legs or coxae. These adults are not very active. They fly only short distances, and when I captured them they tried to dive directly to the ground. The adult male is shorter than the female. The male has very strong, curved pins on the lower abdomen, and very strong claws which aid it in holding the female very tightly during mating period. The abdomen of the females were filled with eggs.

Needham, in his bulletin, said, "This nymph and adult are good fish bait."

The adults and nymphs of these insects were determined by the author.

Pteronarcella badia Hag Little Curler. This nymph is found in many stations wherever A. pacifica is found. Its habitat is similar to the above nymph, but its size is smaller. The characteristics of this nymph are: gill filaments on the first, second, and third ventral abdominal segments. The prothorax is rounded instead of angular. Some of the P. badia were of dark color, while others were a light brown. Its numbers were greater at the Forks and Cave stations.

The adult of this nymph was not collected before June 15, 1954.

The range of three stoneflies--Acroneuria pacifica, Pteronarcys californica, and Pteronarcella badia--is shown on the Logan River map on the following page.

Order Hemiptera (True Bugs)

Corixidae

Corixid sp. The adult water boatman was found in large numbers at the First Dam, Third Dam, and near the Sugar Factory stations. The habitat of this insect is in slow-moving water with vegetation, especially algae and Ranunoulus. It prefers silt bottoms. I collected this insect on October 10 and October 16, 1953; also in March and April 1954.

This insect spends most of its time in shallow waters, resting or clinging to some support with its middle legs. At times it releases itself and rises rapidly by the use of its long hind legs, which are modified for swimming. In the water the insect is silver color on its back. This silvery appearance is due to a coat of air that almost covers the body. The insect must come to the surface for air.

During the first part of June 1954, I noticed these insects mating in the water while they were swimming.

The best characteristic for recognizing this insect is the front

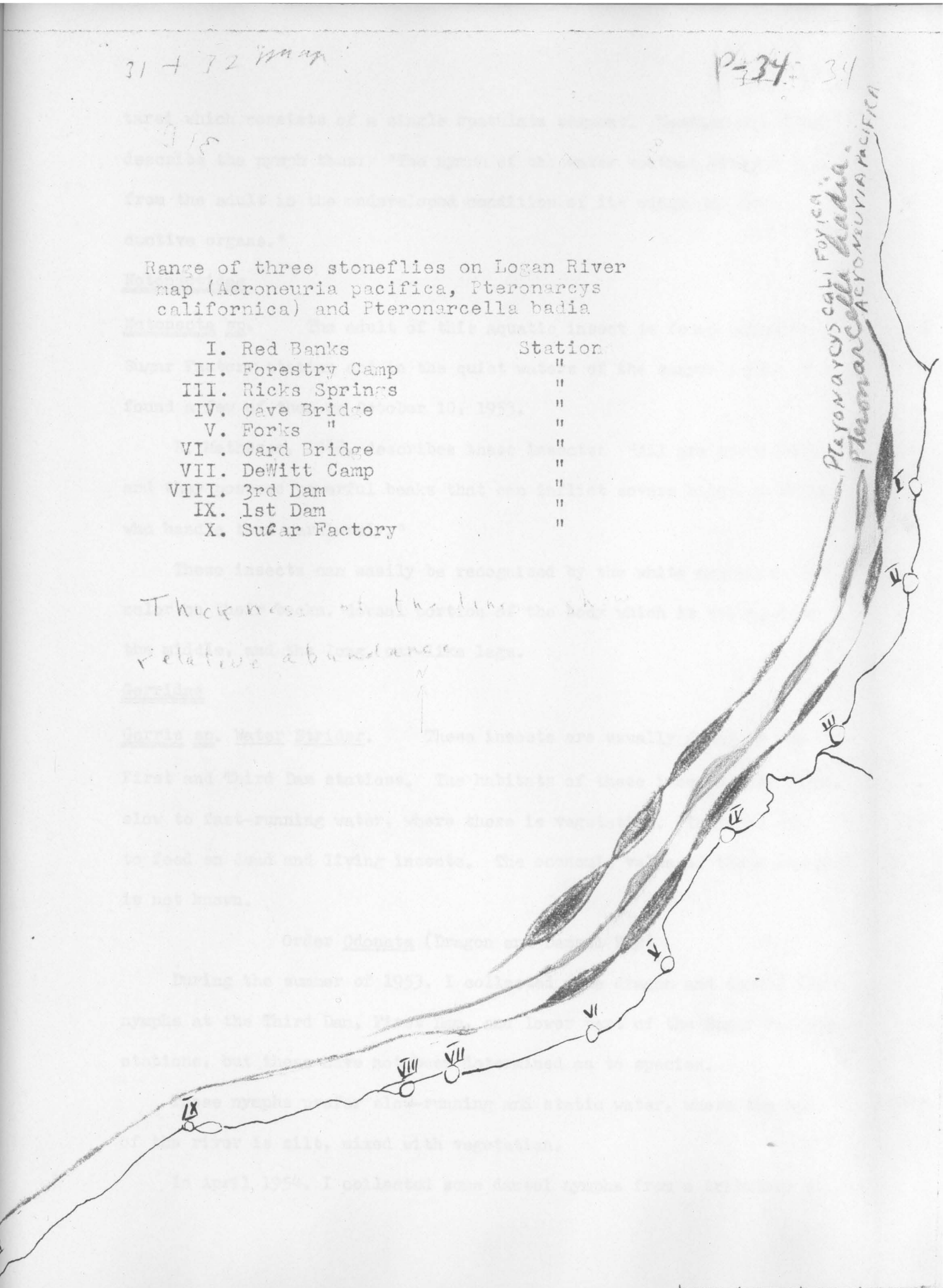
31 + 32 map

P-34-34

Range of three stoneflies on Logan River map (Acroneuria pacifica, Pteronarcys californica) and Pteronarcella badia

I.	Red Banks	Station
II.	Forestry Camp	"
III.	Ricks Springs	"
IV.	Cave Bridge	"
V.	Forks "	"
VI.	Card Bridge	"
VII.	DeWitt Camp	"
VIII.	3rd Dam	"
IX.	1st Dam	"
X.	Sugar Factory	"

Thickness of line = relative abundance



5 mi

tarsi which consists of a single spatulate segment. Needham and Lloyd describe the nymph thus: "The nymph of the water boatman differs chiefly from the adult in the undeveloped condition of its wings and reproductive organs."

Notonectidae

Notonecta sp. The adult of this aquatic insect is found below the Sugar Factory station and in the quiet waters of the canyon dams. I found a few of them on October 10, 1953.

R. Matheson, 1948, describes these insects: "All are predacious and they possess powerful beaks that can inflict severe bites on those who handle them carelessly."

These insects can easily be recognized by the white and black color on their backs, dorsal portion of the body which is keeled down the middle, and the long, oar-like legs.

Gerridae

Gerris sp. Water Strider. These insects are usually found at the First and Third Dam stations. The habitats of these insects vary from slow to fast-running water, where there is vegetation. They are said to feed on dead and living insects. The economic value of these insects is not known.

Order Odonata (Dragon and Damsel Fly)

During the summer of 1953, I collected some dragon and damsel fly nymphs at the Third Dam, First Dam, and lower part of the Sugar Factory stations, but these have not been determined as to species.

These nymphs prefer slow-running and static water, where the bed of the river is silt, mixed with vegetation.

In April 1954, I collected some damsel nymphs from a tributary of

Logan River near the Third Dam station where the water was swift and very shallow, and the bed of the stream was stones and gravel. The nymphs were small, dark in color, and they have tails with three leaf-like gill plates. The nymph moves very slowly and sluggishly, and has an undulating movement. Their food habits were described by Needham as: "They are carnivorous."

Most of the adult damsel flies I found last summer were bluets (males, bright blue in color and females gray), and were found in lower stations of Logan River. They were found darting and perching on vegetation. Up to June 15 of 1954 I have found no specimen of these insects. The adults are also carnivorous, as described by Needham.

Libellulidae

Sympetrum sp. The nymph of this dragon fly was found inadvertently during my classification of insects collected from Logan River. Needham described the adult of this insect in his bulletin No. 201, saying: "This nymph is associated with the Lestes nymph at lower part of Logan River."

The nymph and also the adult of these insects are carnivorous.

Coenagrionidae

Lestes sp. One nymph was found at the Third Dam station, but it was smaller than the Lestes described by Needham.

Order Coleoptera (Beetle Larvae)

Elmidae

Elmis sp. These larvae were collected October 10, 1953, at the Sugar Factory station, and on February 5, 1954, at the Forks and DeWitt Camp stations. These larvae are small, less than 10 millimeters in length, and the color is light brown to dark. The dorsal part of the

body is keeled; the anterior and posterior ends of the body are pointed.

The most interesting thing about this larva is the appearance of gill filaments at the posterior end of the body. These gill filaments are retracted when the larvae are taken from the water. These filaments function similarly to those of stoneflies for respiration.

The habitat is swift-running water, with trash of leaves and small branch stems.

The adult of this insect is not found in my collection.

Dytiscidae

Hydroporus sp. This larva is found in small numbers at the Third and First Dam stations. Its habitat is slow and fast running water where there is vegetation and gravel or silt in the bed of the river.

The adult beetles are found at the Forks, DeWitt Camp, and First Dam stations. The adults show an undulating movement of the body when they are placed in a vessel of water.

Order Trichoptera (Caddice Fly Larvae)

These larvae are probably equal in numbers to mayfly nymphs in Logan River. They are found in every station mentioned above. In some stations the number of Brachycentrus species and Glossosoma were innumerable. They range in size from the small Leptocerus species to large Hydropsyche and Limnephilus species. They are very important as food for trout and white-fish.

Their habitat ranges from high to lower elevations, but they decrease in number at the lower elevations.

Most of my collection of adults and some larvae of caddice flies were sent to Dr. Ross, University of Illinois, for identification, but unfortunately the shipment has not returned with identifications.

Most of my collections were larvae of caddice flies, and they were determined by Dr. Stanford and myself. These are:

Hydropsychidae

Hydropsyche sp. These larvae are found in most stations, but they decrease in numbers at DeWitt Camp, Third Dam, First Dam, and the Sugar Factory stations. They prefer the running (lotic) cold water with a river bed of boulders, stones, and gravel. No case is present, and the pro-, meso-, and metanotum of each has a single large sclerotized shield. Conspicuous branched tracheal gills are also present.

Brachycentridae

Brachycentrus sp. These larvae, with rare exceptions, are found in all stations, but they increase in number where the water is not more than one foot above the surface of rocks. In Ricks Spring and below Cave Bridge stations they are countless. They stick on the boulders like needles and pins on a pillow.

The common name for this larva is the square case caddice larva; this case, no doubt, is a very important protection to it. It extends its legs and head during movement; it is very sensitive to disturbances.

I tried many times to get the larva from the case, but it withdrew at once when I touched it. One must break the case to get it out.

The best characteristic with which to identify this larva is the conical case of sand grains, or of vegetable material, and square in cross section.

Rhyacophilidae

Glossosoma sp. In some stations, especially Card, and below the Forks, these are very numerous. The larva of this genus has a protective case built of small rocks or gravel, and it is impossible to

get the larva out without removing the case. This larva prefers running water with a bottom bed of boulders and rocks. The case is turtle-shaped, with openings below.

Rhyacophila sp. These larvae were collected many times from Red Banks station, but they decrease in number at the lower stations where the water becomes slow-running and the bottom of the river has more silt and gravel. This larva is recognized by its beautiful green color, its free living condition, the presence of many hairs on the body, and the last segment sclerotized dorsally. These larvae are few in number, perhaps because of lack of attachment and the resulting availability to fish. R. W. Pennak, 1953, regards the Rhyacophila sp. as a carnivorous aquatic insect, feeding on small crustaceans, annelids, and insect larvae.

Limnephilidae

Limnephilus sp. These larvae are few in number. They have large cases built from sand and gravel, triangular or circular, and compactly constructed or sometimes loose. This larva was found in the upper stations.

Leptoceridae

Leptocerus sp. This larva is found near the Third Dam in the tributary of Spring Hollow. The case is a translucent, elongated, silken cone; and on the larva the second tarsi is bent. It prefers shallow water with gravel and rocks.

Leptocella sp. This is also found in small springs, shallow water with gravel and rocks.

Order Diptera (True Fly Larvae)

There are many species of larva flies found along Logan River.

Their distribution in the stations mentioned above is well known. They were found in different habitats, most of our specimens being collected in running water with a river bed of boulders and gravel. The food habits of these larvae are mostly carnivorous; a few of them are herbivorous.

The general shape of these larvae is worm-like, rounded, and usually legless. Most of my collection of these insects are larvae, with very few adults.

Collection of these larvae was made from October 2, 1953, to June 17, 1954. Below is a discussion of these larvae:

Tipulidae

Tipula (Crane Flies). Tipula is the largest of aquatic crane-fly larvae. I collected one specimen of this larva June 17, 1954, at the Forks station. It was greenish to gray in color. It was found in the river bed with trash and boulders, where there was silt and sand near the left bank of the station.

It is readily recognized by the posterior end, consisting of six lobes.

Eriocera sp. The Eriocera were collected at Red Banks, Ricks Spring, Forks, and DeWitt Camp stations. The common name for this larvae is pushring. The larva is yellowish, transparent, and easily recognized when it is alive by its ability to expand the posterior end of the body into a so-called push ring.

It is free living.

Antocha sp. The genus Antocha larva is found in many stations of Logan River. The larva possesses gills and the body is slender, tapering behind into two elongated lobes tipped with hairs; and shows

six dark or light brown spots on the dorsal and ventral surfaces. It is free living.

Blepharoceridae

Bibiocephala sp. This larva is found in large numbers at the Forks station. It is also found at Cave and DeWitt Camp. The larva is easily recognized by six suckers on the ventral surface of the body; and the body is divided into seven distinct segments. Also, it has gill tufts composed of three filaments, all directed forward. Its skin is black and leathery. It is found in running, shallow water, with rocks and large stones, onto which the larva sticks. Its six suckers are a very strong device, and act as an anchor for the larva in the swift (white) water.

Tendipididae (Chironomidae)

Tanytarsus sp. (Logan Midge). The Logan midge is found in many stations where the water is white and swift, and the bottom of the river is sand, gravel, and silt.

Chironomus sp. (Blood Worm). The blood-worm larva is found in fast-running water, and also in slow waters with boulders and with green algae covering the stones in the river.

Needham described this midge and blood worm as follows: "They are the most important herbivores of the stream." He also indicated that the Logan midge is the smallest insect of Logan River.

Psychodidae

Pericoma sp. These larvae are found in many stations, but are numerous at DeWitt Camp, and present in small numbers below the Forks and Forestry Camp stations.

These larvae are not mentioned in literature of Logan River. The

larva was determined by the author.

The larva is small, not more than five millimeters in length. Its color is black and the head is small in proportion to the thickness of the body. The body is thickly covered with hairs except for the head and tail. The tail has a bunch of filaments (usually filament gills). The larva is free swimming and may easily be eaten by fish.

Simulidae

Simulium sp. This larva is found in many stations with swift, white water with a boulder river bed. It is small and whitish, not more than 10 mm. in length. It has a sucker at the posterior end with which it attaches itself to rocks or stones. The head has two plankton-gathering "fans" whose plumose rays strain out food from the passing current (Needham).

It is also readily recognized by its sac-like shape, slender at the mouth and enlarged at the posterior end of the body.

Culicidae

Culex sp. These larvae are found where the water runs very slowly at the Third Dam and First Dam stations. The larva of Culex is recognized by its respiratory tube with several pairs of ventral tufts of hair.

Aedes sp. The genus Aedes larva can be identified by the presence of an anal segment with a dorsal, saddle-shaped sclerotized plate, and the median ventral brush posterior to the ring. Both genera are widely distributed, especially the adults. Their numbers increase in the marshes of Logan River, but they are very few in number in the upper and middle part of the river.

Rhagionidae

Atherix sp. (Snipe-fly Larvae). Snipe-fly larvae are numerous at most stations with the exception of the Third and First Dam stations where they are scarce. This larva is greenish to yellow in color. Its size varies from small to large (one inch). It prefers fast-running or slow water with a river bed of boulders and gravel.

One good characteristic for recognizing this larva is the presence of two long, fringed, terminal filaments at the end of the abdomen.

The larva is soft and transluscent, and free living.

Tabanidae

Chrysops sp. (Deer Fly). Deer fly larvae are very few in number in my collection. I collected one specimen on October 1953. It is readily recognized by its spindle-like form and tubercles girdling each segment. The larvae are free living and very predaceous.

SUMMARY

In this study of the insects of Logan River I have tried to get as complete a collection as possible during the nine months of September to June, in which this study was in progress.

The genera and species collected were principally in the immature stages, because the study was made during the fall, winter, and spring months. However, a number of stoneflies and caddice flies emerged in early spring, and some mayflies somewhat later. Few adults of other orders were collected.

The distribution of the insects was also investigated at designated points (called stations) along the river, a distance of 21 miles, and from elevations of 6,350 to 4,475 feet. Collecting trips were made to these points 25 times during the nine months of the study. Complete stream data were written on a form at each station on each trip. Notes on habitat, and descriptions are given of all the insects with a few exceptions.

A survey of the literature reveals 91 species of aquatic insects collected in or near the river. In this study approximately 44 genera and 22 species were collected and classified. Seven are new records.

There is every reason to believe that other insects that have not yet been described live in the river.

The specimens were identified as follows: The Ephemeroptera by Dr. G. F. Edmunds of the University of Utah; the Plecoptera by Dr. A. R. Gaufin, also of the University of Utah; the remainder by the author and

by Dr. J. S. Stanford of the Utah State Agricultural College.

It is hoped that in this investigation facts have been discovered and suggestions made that will give the reader a better knowledge of the insect fauna, and also that it may serve as a guide for investigators who may follow.

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